PATENT SPECIFICATION 1,120,020

DRAWINGS ATTACHED.

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COMPLETE SPECIFICATION.

Improvements in or relating to Watch Winding and Setting Control Devices.

We, KABUSHIKI KAISHA DAINI SEIKOSHA, a Japanese company, of 47, 6-chome, Kameido-cho, Koto-ku, Tokyo, Japan, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention concerns improvements in or relating to watch winding and setting control devices.

The invention is particularly applicable to watches incorporating automatic calendars, in which the watch winding and setting control device is required to effect winding and to effect setting both of the indicated time and of the date displayed by the watch.

In some conventional watches, a single winding and setting control device is provided, the device being pulled axially outwardly to an extended position in which it is rotated to adjust the indicated time, and the device being depressed axially inwardly to effect adjustment of the date. Thus, each time the control device is depressed, the date displayed is changed by one unit. A disadvantage associated with such control devices is that inadvertent depression of the control device, either as the wrist-watch is being worn or due to careless handling thereof, causes unwanted changes to be made in the indicated date.

According to the present invention there is provided a watch winding and setting control device having a shaft which is rotatable about its axis to effect winding and which is translatable axially to effect setting of an indicated time and/or date, the shaft having at its outer end a shaft head provided with an axially outer portion, of non-circular cross-sectional profile which is slidably received in an axially extending bore of corresponding non-circular cross-sectional profile provided in a sleeve surrounding the shaft head, and resilient means for urging the shaft head in an axially outward direction against a stop surface provided on the sleeve, whereby rotation of the sleeve causes rotation of the shaft, and the shaft head is movable axially inwardly independently of the sleeve and against the action of the resilient means.

Axially inward movement of the shaft head may be used to effect adjustment of the date setting, and since this movement is unaccompanied by movement of the surrounding sleeve, inadvertent depression of the shaft is effectively prevented by the surrounding sleeve.

Preferably the axially outer end of the sleeve is disposed substantially flush with the axially outer end of the shaft head when the latter is in engagement with said stop surface.

Said stop surface may be formed at the junction of the said non-circular bore with a substantially circular bore in the sleeve axially inwardly of the non-circular bore, said circular bore having a diameter which is slightly greater than the maximum width of the non-circular bore, and the shaft head having an annular shoulder inwardly of said axially outer portion which shoulder is urged against the stop surface by said resilient means.

Preferably the resilient means comprises a compression spring which is compressed between an axially inwardly facing surface on the shaft head and an axially outwardly facing surface on a washer attached to the

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sleeve at the axially inner end thereof. Said washer may be secured within the said substantially circular bore by a radially inwardly turned lip at the axially inner end of the circular bore, the lip engaging the periphery of the washer on the side thereof remote from the spring.

The invention also comprises a watch provided with a winding and setting device as hereinabove defined and as described hereinafter.

The invention will now be described, by way of example only, with reference to the accompanying drawings, in which:—

Figure 1 is an axially sectioned perspective view of a watch winding and setting control device according to one embodiment of the invention,

Figure 2 is a plan view of the device shown in Figure 1, viewed in the direction of arrow II of Figure 1, and

Figures 3, 4 and 5 are plan views, corresponding to that of Figure 2, of winding and setting control devices according to alternative embodiments of the invention.

Referring to Figure 1, a watch winding and setting control device has a shaft 1 which extends coaxially through and is spaced radially from a tubular member 2 extending radially through a watch case 3, part only of which is shown. At its axially inner end the shaft 1 is provided with a threaded bore 4 by which it is secured to the winding and setting mechanism (not shown) internally of the watch. A packing ring 5 is disposed in an annular groove 6 formed in the external surface of the shaft 1 within the tubular member 2, the packing ring 5 sealingly engaging the internal surface of the tubular member 2 to provide a water-tight seal between the interior and exterior of the watch case 3.

At its axially outer end the shaft 1 is provided with a shaft head 7 which has an axially outer portion 7*a* of non-circular cross sectional profile and, axially inwardly of the portion 7*a*, a portion 7*b* of circular cross-sectional profile. An axially outwardly facing shoulder 8 is formed at the junction between the outer and inner portions 7*a*, 7*b*, the diameter of the portion 7*b* being slightly greater than the diagonal width of the portion 7*a*.

The shaft head 7 is slidably received in a surrounding coaxial sleeve 10. At its axially outer end the sleeve 10 is provided with a non-circular bore 10*a*, the profile of which corresponds to that of the outer portion 7*a* of the shaft head 7, so that the latter is a sliding fit in the bore 10*a*.

In the embodiment of Figures 1 and 2, the non-circular cross-sectional profile of the shaft head portion 7*a* and the bore 10*a* is square, while in the alternative embodiments of Figures 3, 4 and 5, this cross-sectional profile is that of an equilateral triangle, a hexagon, and a truncated circle respectively. It will, however, be appreciated that, since the object in providing the portion 7*a* and the bore 10*a* is to ensure a rotational drive connection between the sleeve 10 and shaft 1, any non-circular cross-sectional profile may be employed.

Inwardly of the bore 10*a*, the sleeve 10 is provided with a circular bore 10*b*, the diameter of which is slightly greater than the maximum diameter of the bore 10*a*, such that the portion 7*b* of the shaft head 7 is a sliding fit therein. The junction between the bores 10*a*, 10*b* comprises an axially inwardly facing stop surface 11.

The sleeve 10 extends axially inwardly of the inner end of the shaft head 7 and is received in a cylindrical recess 12 in the watch case 3. An annular washer 13 is disposed within the sleeve 10 at its axially inner end, the washer 13 being retained in the sleeve 10 by means of a radially inwardly turned annular lip 14 formed at the inner end of the sleeve 10.

A compression spring 15 is compressed between the axially facing surfaces of washer 13 and the shaft head 7. Thus, as shown in Figure 1, the shaft head 7 is urged axially outwardly relative to the sleeve 10 by the spring 15 so that the shoulder 8 engages the stop surface 11.

To assemble the device, the shaft head 7 is first located in the sleeve 10 against the stop surface 11, the spring 15 is inserted, and the washer 13 then placed in position. The washer 13 is then secured to the sleeve 10 by inwardly turning the inner end of the sleeve 10 to form the lip 14.

When it is desired to wind the watch, the sleeve 10 is rotated about its axis in the conventional manner, the sleeve 10 being provided with an external milled surface 16 for this purpose. By virtue of the non-circular profiles of the bore 10*a*, and the portion 7*a* of the shaft head 7, the rotation of the sleeve 10 is transmitted to the shaft 1 and thence to the winding mechanism (not shown) of the watch.

When it is desired to change the time indicated by the watch, the sleeve 10 is pulled axially outwardly, the spring 15 ensuring that the shaft head 7 moves outwardly with the sleeve 10. Rotation of the sleeve 10 in its axially outer position (not shown) effects rotation of the shaft 1 as described above, in this case to effect direct movement of the watch hands, again in a conventional manner.

To change the date displayed by the watch, the shaft head 7 is depressed relative to the surrounding sleeve 10, against the action of the compression spring 15, moving the shaft 1 axially inwardly and independently of the sleeve 10. Each time the

shaft 1 is moved axially inwardly in this way, the indicated date is changed by one unit, the shaft head 7 being returned to its initial position, as shown in Figure 1, when released by the action of the spring 15.

It will be seen from Figure 1 that when the shaft head 7 is in its axially outermost position relative to the sleeve 10, that is, when the shoulder 8 engages the stop surface 11, the outer end of the shaft head 7 is substantially flush with the outer end of the sleeve 10. Thus, the sleeve 10, which is not displaceable in an axially inward direction, effectively protects the shaft head 7 against inadvertent depression due, for example, to pressure exerted on the device during wear of the wrist watch or to the axially outer end of the control device resting on a table when the watch is not being worn.

To assist the sliding movement of the shaft head 7 within the sleeve 10 and prevent "binding" thereof, each axially extending edge between adjacent plane faces of the axially outer portion *7a* is chamfered, as indicated at *7c* in the embodiments of Figures 2 to 4.

The provision of the compression spring 15 serves to return the shaft 1 to its normal position against the stop surface 11 (Figure 1) even if the internal return spring (not shown) provided in the watch mechanism should weaken to the extent that it cannot overcome the frictional resistance afforded by the packing 5.

WHAT WE CLAIM IS:—

1. A watch winding and setting control device having a shaft which is rotatable about its axis to effect winding and which is translatable axially to effect setting of an indicated time and/or date, the shaft having at its outer end a shaft head provided with an axially outer portion of non-circular cross-sectional profile which is slidably received in an axially extending bore of corresponding non-circular cross-sectional profile provided in a sleeve surrounding the shaft head, and resilient means for urging the shaft head in an axially outward direction against a stop surface provided on the sleeve, whereby rotation of the sleeve causes rotation of the shaft, and the shaft head is movable axially inwardly independently of the sleeve and against the action of the resilient means.

2. A device as claimed in claim 1 in which the axially outer end of the sleeve is substantially flush with the axially outer end of the shaft head when the latter is in engagement with said stop surface.

3. A device as claimed in claim 1 or claim 2 in which said stop surface is formed at the junction of the said non-circular bore with a substantially circular bore in the sleeve axially inwardly of the non-circular bore, said circular bore having a diameter which is slightly greater than the maximum width of the non-circular bore, and the shaft head having an annular shoulder inwardly of said axially outer portion which is urged against the stop surface by said resilient means.

4. A device as claimed in any of claims 1 to 3 in which the resilient means comprise a compression spring which is compressed between an axially inwardly facing surface in the shaft head and an axially outwardly facing surface on a washer attached to the sleeve at the axially inner end thereof.

5. A device as claimed in claim 3 and claim 4 in which said washer is secured within the said substantially circular bore by a radially inwardly turned lip at the axially inner end of the circular bore, the lip engaging the periphery of the washer on the side thereof remote from the spring.

6. A device as claimed in any preceding claim in which the shaft extends co-axially within and is spaced radially from a tubular member, a packing ring being located between said shaft and said tubular member to provide a watertight seal therebetween.

7. A device as claimed in any preceding claim in which the non-circular cross-sectional profile of said axially outer portion of the shaft head and of said non-circular bore is substantially square, triangular, or hexagonal, or has a truncated circular shape.

8. A device as claimed in claim 7 in which the axially outer portion is provided with chamfered edges at junctions between adjacent plane faces of its outer surface within the said non-circular bore.

9. A watch winding and setting control device substantially as herein described with reference to and as shown in the accompanying drawings.

10. A watch provided with a winding and setting device according to any one of the preceding claims.

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1 SHEET *This drawing is a reproduction of the Original on a reduced scale*

Fig.1.

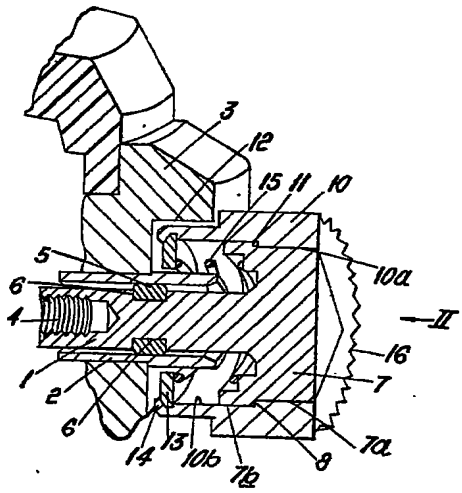

Fig.2.

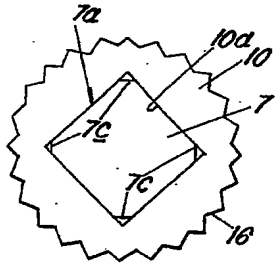

Fig.3.

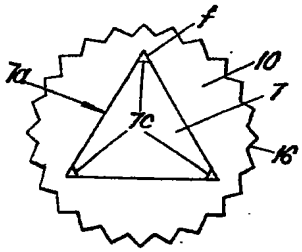

Fig.4.

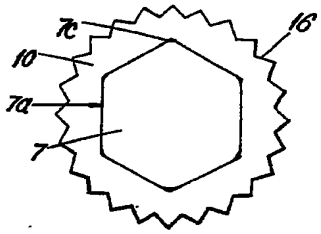

Fig.5.